

VASAVI COLLEGE OF ENGINEERING
(Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Chemistry
Course Name : **BATTERY SCIENCE AND TECHNOLOGY (OE)**

SYLLABUS FOR B.E. III SEMESTER

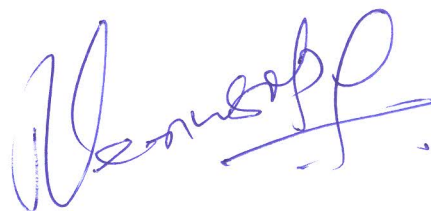
L : T : P (Hrs./week):2:0:0	SEE Marks :60	Course Code :U19OE310CH
Credits :2	CIE Marks :40	Duration of SEE :3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES <i>On completion of the course, students will be able to</i>
1. To introduce the various terms to understand the efficiency of batteries.	1. Discuss the construction, electrochemistry, technology and applications of selected primary batteries.
2. To know the relevant materials required for the construction of primary and secondary batteries.	2. Discuss the construction, electrochemistry, technology and applications of few secondary batteries.
3. To familiarize with the reactions involved during charging and discharging processes.	3. Explain the working principle, electrochemistry, technology and applications of prominent fuel cells.
4. To focus on the need of fuel cells and the concept of their construction and functioning.	4. Evaluate different batteries or fuel cells in order to select a suitable battery or fuel cell for a given application
5. To emphasize on the merits and demerits of each type of battery.	

UNIT-I: BATTERIES- FUNDAMENTALS

Introduction and types of batteries: Primary and secondary.

Battery characteristics: Free energy change, electromotive force of battery, ampere-hour, capacity, power, power density, energy density,



efficiency, cycle life, tolerance to service conditions, performance characteristics.

UNIT-II: PRIMARY BATTERIES

Construction, chemistry and technology of Zinc-Air Battery, Zinc -HgO battery and their applications.

Primary lithium batteries: Soluble cathode cells, solid cathode cells- Lithium manganese dioxide, solid electrolyte cells- Lithium polymer electrolyte battery- Applications. Reserve battery- Electrochemistry of perchloric acid cell- applications.

UNIT-III: SECONDARY BATTERIES

Construction, chemistry and technology of maintenance free lead acid battery (MFLA), valve regulated lead acid battery (VRLA), absorbed glass mat lead acid battery (AGMLA) - comparison between lead acid battery and VRLA along with advantages - Construction, electro chemistry and applications of Nickel-Cadmium battery, Nickel metalhydride battery.

Lithium ion batteries: Construction, chemistry and applications of liquid organic electrolyte cells, polymer electrolyte cells, lithium ion cells.

UNIT- IV: FUEL CELLS

Introduction, classification based on temperature and nature of electrolyte. Working principle, components, applications and environmental aspects of alkaline fuel cell (AFC)- Hydrogen-Oxygen alkaline fuel cell, Molten carbonate fuel cell (MCFC), Polymer electrolyte membrane fuel cell (PEMFC), Solid oxide fuel cell (SOFC).

Learning resources:

1. P.C.Jain and Monica Jain, "Engineering Chemistry", DhanpatRai and Pub, Co., New Delhi (2002)
2. S.S. Dara "A text book of engineering chemistry" S.Chand and Co.Ltd., New Delhi.(2006).
3. Dell R. M. and Rand D. A. J., "Understanding Batteries", Royal Society of Chemistry, UK, 2001.
4. Chemistry of Engineering Materials by R.P Mani and K.N.Mishra, CENGAGE learning



5. ShashiChawla, "Text Book of Engineering Chemistry", DhanpatRai Publishing Company, NewDelhi,2008.
6. BalasubramanianVishwanathan, "Energy sources", Elsevier Publications.

The break-up of CIE : Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	<input type="text" value="2"/>	Max. Marks for each Internal Tests	:	<input type="text" value="30"/>
2	No. of Assignments	:	<input type="text" value="2"/>	Max. Marks for each Assignment	:	<input type="text" value="5"/>
3	No. of Quizzes	:	<input type="text" value="2"/>	Max. Marks for each Quiz Test	:	<input type="text" value="5"/>

Duration of Internal Tests : 90Minutes

